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# GREAT LAKES FREIGHTERS GRADUALLY TURN TO WELDING

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THE full size, 600-foot type, Great Lakes freighter has always been, and still is, a riveted ship but times are fast changing. Welding, which came into use in a very limited way in the lakes region some twenty years ago, gained slowly in its application to the big freighters until the 1930's. Most of the welding was incidental. Today, however, there is a definite trend to the use of welding in parts hitherto not considered.

One reason for the slowness of shipbuilders in the lakes region to accept welding lies in the nature of the boats themselves. For many years the 600-foot type freighters have been standardized full-bodied ships, slow and heavy, but fully capable of fulfilling their function of carrying large cargoes over comparatively short runs. They are constructed simply, and do not represent the capital investment of ocean-going vessels. Furthermore, the average ore-carrying boat is laid up five months a year and its earning time is only about 60 per cent of that of the ocean vessel. Consequently there is not the same opportunity to demonstrate a savings on the lakes as on the sea and modern developments in the interests of economy have been slower in taking place.

Another reason for the slower advance lies in the lack of building activity during recent years. Only 34 ore carriers have been built since the war and none was constructed from 1930 to 1937, during the time in which welding developed most rapidly. This means that Great Lakes shipbuilders have had little opportunity to put new ideas into practice.

In March, 1937, the Pittsburgh Steamship Company, subsidiary of the United States Steel Corp., let contracts for four new boats to be added to its fleet. Two of these vessels were contracted from the Great Lakes Engineering Works, River Rouge, Mich., and two from the American Ship Building Co., Cleveland, Ohio. They represented the first new construction in eight years and are therefore important as exhibits of modern lake freighters and a step on the road to modernization.

## Sections Welded

The two boats built by the American Shipbuilding Co. and delivered in May, 1938, were the *William A. Irvin* and the *Governor Miller*. Both were constructed to the same dimensions, including overall length of 610' 9", beam of 60', depth 32' 6", draft 22' 1½", gross tonnage of 8255 tons, and net tonnage of 6137

tons. Each was constructed with three holds and a total of 18 hatches, 16 of which were 38'x11' in size and 2 of 38'x10'. The boats are single screw propelled from a double-reduction geared compound marine steam turbine.

These latest of Great Lakes freighters are essentially riveted ships, but welding was used extensively and far more than ever before. Welding fabrication was given general preference for many of the units which can be readily shop assembled, such as skylights, stacks, masts, etc., for reasons of economy and lightness. In addition to the above units, the tank top, side tanks, house tops, all foundations and certain parts of the decks were welded. Watertightness represented the principal reason for welding these parts, particularly with reference to the tank top and side tanks which are subject to severe wear. Generally speaking, there was no particular attempt to save weight or reduce cost through welded construction. However, the serviceability of the parts so fabricated represented a definite improvement which will be taken into consideration in any future building.

## The Future

Although some small boats, up to 300 foot length, for canal and lake service, have been built of all-welded construction, the big 600-foot lake freighters constitute a different picture. Welding on the *William A. Irvin* and *Governor Miller* represents a moderate step toward a changed future program of building. In the construction of future lake ships we will undoubtedly make large sub-assemblies in the form of welded sections in which welding can be positioned, thus eliminating a large part of the overhead and vertical welding. Such procedure will make it possible to do the bulk of all welding under the most ideal conditions.

The sub-assemblies, as referred to, will include sections of inner bottom structure, side tanks, bulkheads, webs, arches, etc., possibly including even deck houses. As to shell plating and strength decks, it is quite likely that the plating will have riveted seams and flush welded butts. The bulk of the welding will be by hand but we will also employ automatic welding wherever possible.

Many advantages are looked to in the future selection of welding over riveting. Welded butts in the shell plating will eliminate considerable resistance when the vessel is driven through the water. They will also de-

crease the weight of the shell and eliminate rivet slippage, thus reducing the deflection of the vessel. In the case of stacks, skylights, etc., there is the advantage of greater strength, less weight, lower construction cost and improved appearance.

Rapid advances have been made during recent years, generally, in shipbuilding methods. Great Lakes shipyards have been somewhat hampered in keeping pace,

due to the lack of new construction and the dependency of the yards on repair work. This has necessitated the maintenance of complete riveting facilities. However certain changes are now inevitable. Future new construction will find welding taking the place of riveting to an ever increasing degree.

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